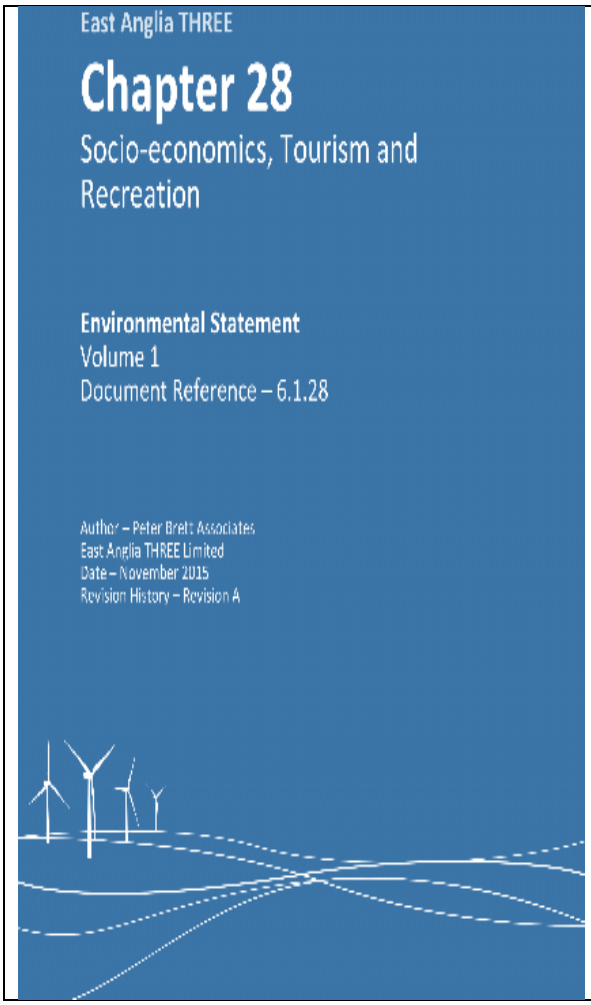
Technical Report 2: Socio-economic impact assessment in Environmental Statements (ESs) for UK Offshore Wind Farms



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Executive Summary

Research aims and methods: Environmental Statements for Offshore Wind Farms (OWFs) set out the predicted impacts of project construction, operation and decommissioning stages, with approaches to mitigating adverse effects and enhancing beneficial effects. The aim of this research is to document the extent to which socio-economic impacts (SEI) are covered in the ESs for recent large OWF projects, and to identify the relative coverage of (i) social, (ii) economic impacts and (iii) others (e.g. cumulative), and to identify the relative coverage of SEI in the various stages of the OWF lifecycle. The research also seeks to identify trends over time (eg are SEI getting higher profile?); and to explain variations in ES consideration of impacts (e.g. more coverage for larger projects; any variations according to distance from shore?). There is also a consideration of evolving approaches to methodology, to mitigation, enhancement and monitoring, and to overall good practice.

The review concentrated on OWFs of c 50MW and over, thus excluding some of the early small projects. The review also took only ESs undertaken from 2010 onwards, although this time-period does include the rapid growth of UK OWF activity. It includes 22 projects ranging in size from 50 MW to 2400MW. In total, the ESs contain proposals for over 15GW of power. The bulk of the ESs have been carried out under the English National Infrastructure Planning regime (Planning Act 2008), and many of the OWFs are now in operation or under construction. There was an assessment of each ES against a 9-point template covering the research aims. All the ESs contain some element of socio-economic assessment. However, comparisons between the ESs, especially quantitative comparisons are complicated by variations in specification of the scope of coverage; for example, are impacts for both onshore and offshore project elements, or only for the offshore element; for each stage of the project (e.g. construction and O&M; or for both together) etc ? Appendix A seeks to synthesize, in chronological order, some of the main findings from the substantial ES reviews undertaken and, together with other relevant publications, provides the basis for the summary findings in this report.

Brief summary of findings:

- All the ESs reviewed to date include a section on socio-economic effects, but there is considerable variation in length of coverage. There is much more coverage of economic than social effects (with a ratio of about c 5:1). ESs clearly recognise the variations in socio-economic impacts over the OWF life cycle. Most include both the construction and the operation and management (O&M) stages, and increasingly ESs are including the decommissioning stage. By far the most attention is for the construction stage. Some studies make clear distinctions between the onshore and offshore activities, but for many this is not clear, and the focus is primarily on the offshore activities. This is unfortunate as the onshore can have important local socio-economic impacts.
- The *ES economic focus* is on employment especially, and on supply chain and GVA impacts. There is also coverage of some related sector impacts, especially on tourism and fishing for offshore works, and on agriculture for the onshore cable route. The scenario approach, usually low/medium/high, is the most popular prediction approach, used as a way of allowing for uncertainty in relation to (i) port location, especially for the construction stage, and (ii) amount of UK supply chain content. Predicted employment figures can vary widely between impact scenarios. There is also the issue of what is local and/or regional in terms of economic impact; some studies avoid specification altogether. Local employment is a low proportion of the total for offshore construction, but much higher for onshore construction and the O&M stage. Mitigation and enhancement measures focus largely on the positive enhancement step in the

mitigation hierarchy. Many of the ESs emphasise local training and upskilling measures, supply chain events and protocols for local businesses.

- The coverage of *social impacts* of OWFs is disappointing. Many ESs give little coverage at all. Some briefly mention social impacts, especially potential construction workforce impacts on housing and local services. A few go further in their coverage of demographic impacts, housing and local services impacts and impacts on local quality of life (QoL). Overall, there appears to be a general assumption that social impacts are not important, and many can be coped out altogether. Methodology is largely descriptive and qualitative, building on baseline studies of local demographics. There is a predominant use of professional judgement and comparative studies. In several studies, there is little evidence of the role of public participation to assess social impacts, yet this is important for socio-economic issues and is a requirement under the English national infrastructure regime. In terms of social impact, a trend in recent years is the provision post ES/examination/decision of a Community Benefits Fund (CBF) to support local communities.

Some best practice learning from current ES practice to improve future practice:

- Use an integrated chapter approach, which includes both socio-economic impacts (employment, economic development, housing, local services etc), and key economic sectors (especially tourism and fishing). The chapter should also bring together impacts of onshore infrastructure (e.g. sub-stations and cable corridor) and offshore infrastructure (turbine cluster, cable array etc). Assess impacts for the key stages of the project lifecycle (i.e. construction, O&M, and decommissioning), and for key spatial impact levels: local, regional and national.
- Where the prediction methodology uses scenarios, set out the logic and assumptions underpinning each scenario; keep the number of scenarios to an absolute minimum, and specify a most likely scenario. Every effort should be made to narrow down the port options.
- For Economic impacts, calculate *o*ffshore and onshore impacts separately, but combine to produce total impacts. Impact predictions for employment and GVA should include clearly identifiable Direct, Indirect and Induced impacts. If an Input-Output/other form of modeling is used, relevant calculations and assumptions need explanation.
- Social impacts should be covered whatever the distance from the coast of the OWF. They will normally include demographic, housing, local services, and wellbeing/QoL impacts, and should be for each project stage/element, time-period and spatial level. However, social impacts are likely to be more qualitative than the economic impacts. Any visual perception studies, for near coast locations, should be included here. There is increasing use of Community Benefits Funds for OWFs.
- Cumulative assessment is important*,* and should be included. However, the potential combination of scenarios involved can complicate assessment; the use of tiered assessment is away forward here. With more decisions on port locations, with their associated OWF-support infrastructure, it may be possible to narrow down the range of scenarios.
- Monitoring of socio-economic impacts in both construction and O&M stages is also important to check on the predictions, and the implementation of mitigation and enhancement undertakings associated with the permission to build. The inclusion in development permissions for an Employment and Skills Plan, or equivalent, can support effective implementation of socio-economic undertakings.

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1. Purpose of the ES review element of the research

1.1 To document the extent to which socio-economic impacts (SEI) are being covered in recent large OWF projects.

1.2 To identify the relative coverage of (i) social, (ii) economic impacts and (ii) others (e.g. cumulative), and the key elements within these broad headings (e.g. is there a dominance of employment and GVA impacts?)

1.3 To identify the relative coverage of SEI in the various stages of the OWF lifecycle (e.g. primary focus on construction stage; O&M becoming better considered?)

1.4 To identify trends over time – eg are SEI getting higher profile; are social impacts getting more of an airing; are new topics coming in (eg Community Benefit Agreements)?

1.5 To explain variations in ES consideration of impacts — e.g. evolution over time; more coverage for larger projects; any variations according to distance from shore?

1.6 To identify evolving approaches to methodology –e.g. from expert opinions to more modelling approaches; and limitations of such approaches

1.7 To identify changing importance of mitigation, enhancement and monitoring measures over time.

1.8 To consider, document and explain any international variations in experience from comparison between UK and EU cases; may also be between English, Welsh and Scottish cases?

1.9 To identify good practice.

2. Research method

2.1 Original ES review framework – applied to each OWF ES

The review of UK OWF ESs concentrated on OWFs of c 50MW and over, thus excluding some of the early small projects. The review also took only ESs undertaken from 2010 onwards, although this time-period does include the rapid growth of UK OWF activity. The review includes 22 projects ranging in size from 50 MW to 2400MW. In total, the ESs contained proposals for over 15GW of power.

Review steps	Focus
1. Specify project	Attributes of project as set out in ES; eg— • name • location

	• developer and socio-economic consultant • MW size • distance from coast • current development stage (planning, consented, under construction, operational etc) • offshore and onshore elements • others
2. Scope of coverage of socio-economic impacts	• sections in ES (eg chapter and/or technical appendix) • depth of coverage (eg from mere mention of socio-economic impacts to in-depth coverage) • stages of development covered –construction, O&M, decommissioning • location of impacts—offshore and onshore • scale of analysis of impacts—local, regional, national
3. Key impacts assessed -- economic	Which of following considered and to what depth? Key issues in examination etc • direct employment effects, including employment generation, local content and safeguarding of existing employment; • indirect employment effects; • other labour market effects, such as changes in wage levels or commuting patterns; • expenditure and income effects, including the use of local suppliers, rates and rental payments and other types of project-related expenditure; • economic effects on existing commercial activities (including tourism, agriculture and fishery); • effects on the development potential of the area, including changes in the image of the area or in investor confidence; and • effects on property values. Significance of impacts: • no • minor • medium • major
4. Key impacts assessed -- social	Which of following considered and to what depth? Key issues in examination etc • effects on population and demographic structure; • effects on accommodation and housing; • effects on community facilities or services; • changes in community character or image; • changes in community stability or cohesion (e.g. due to in-migration); • changes in the incidence of social problems such as crime; • community wellbeing; and • distributional effects, i.e. effects on specific groups in society (e.g. women, the elderly and ethnic minorities). Significance of impacts: • no • minor • medium • major
5. Key impacts assessed—others	To add as appropriate, eg • cumulative • others

6. Methods used for identifying, predicting and evaluating socio-economic impacts	Including for example: • baseline studies • secondary data (statistics, literature) • primary data collection – qualitative, quantitative and how collected • stakeholder analysis • scenario approaches • modelling (eg input–output studies) • causal analysis • others
7. Mitigation and enhancement measures	• mitigation measures • enhancement measures • monitoring provisions
8. Organisation and presentation of socio-economic information	For example: • logic of organisation • clarity of presentation • acknowledgement of difficulties/limitations of approach
9. Others	• some lessons for good practice

2.2 Comparing cases: some fine tuning of the review research method

1. To facilitate comparisons across ES cases, there was some sharpening of the focus on some key elements in the ESs, including construction stage vs O&M and the distinction between onshore and offshore elements.

2. A more quantitative approach was also sought, wherever possible, to complement much of the qualitative information, and to facilitate cross comparisons. To compare across the ES cases, the research employed a number of approaches, including specification of:

- predicted local jobs created, in both construction and O&M stages, in relation to MW size of project. For the O&M stages, the jobs are determined by the location of the O&M ports;
- similarly for some expenditure measures (eg GVA; ratio of Direct : Indirect + Induced expenditure); and
- significance assessments by level (eg: none > major).

The nature of the assessments undertaken and the uncertainties associated with not knowing the primary port of construction and operations have reduced the utility of quantitative methods.

2.3 Issues in comparing and synthesizing the ES reviews

All the ESs contained some element of socio-economic assessment, but comparisons between the ESs, especially quantitative comparisons were complicated by variations in specification of the scope of coverage; for example, are impacts for:

- both onshore and offshore project elements, or only for the offshore element;
- each stage of the project (e.g. construction and O&M; or for both together);

- peak year of construction impact or total years of construction (similarly for O&M stage); and
- which spatial impact area (e.g local, regional, national) is being assessed?

Appendix A (1- 4) seeks to synthesize, in chronological order, some of the main findings from the substantial ES reviews undertaken, divided into: overview information of the socio-economic content in each ES; economic impacts (employment); economic Impacts (GVA etc); and social impacts. This Appendix, together with other relevant publications, provides the basis for the following summary of findings.

3. Summary of findings

Purpose of the ES reviews	Findings to date
3.1. To document the extent to which socio-economic impacts (SEI) are being covered in recent large OWF projects.	• All the ESs reviewed to date include a section on socio-economic effects, but there is considerable variation in length of coverage (eg from 17pp for Blyth Demonstration to over 150 pp for the Atlantic Array and Moray East). Although there is evidence of considerable growth in the size of OWF ESs over time (eg. Hornsea 3 at 2400MW) (Howard 2013), the socio-economic element has not grown substantially, and the content in the more recent ESs is normally in the range of 50-100 pages. However, precision is difficult, as some studies have additional appendices, and extra sections sometimes required by examination bodies. Of course, length of coverage does not always equate with depth and quality of coverage. • Socio-economic impacts are a key part of a much wider definition of the Human Environment, which in some ESs may include a range of other topics. In order of importance of coverage, these other topics include: Tourism; Commercial Fishing; Seascape, Landscape and Visual; Shipping; Traffic, and Archaeology. Sometimes one or more of these topics are include in the socio-economics chapter. At other times, they are in separate chapters. Whilst this analysis briefly includes these other topics, especially the first three, the focus is clearly on socio-economic impacts. The latter include economic impacts (e.g. employment, GVA (Gross Value Added) and supply chain, and social (e.g. demographic, housing, local services and quality of life). • The bulk of the ESs have been carried out under the English National Infrastructure Planning regime (Planning Act 2008), and many of the OWFs are now in operation or under construction. In addition, there have been a number of ESs carried out under the Scottish Planning system; here only one of the proposals has recently been completed, and another is nearing completion. • The developers include major international energy companies such as DONG (now Orsted), Vattenfall, and SSE which are each responsible for promoting several projects. In addition, there are several other more single project-specific developers. • A number of major consultancies have been involved in undertaking the socio-economic studies, including: Royal Haskoning and RPS. Sometimes, and with a growing trend, there is subcontracting of socio-economic content to firms that specialize in this field, such as: Regeneris, Arcus and SQW.

3.2 To identify the relative coverage of (i) social, (ii) economic impacts and (iii) others (esp cumulative, and monitoring)	• There is much more coverage of economic than social impacts (with a ratio of about c 5:1). This may reflect the more quantitative and measurable nature of economic impacts. If anything, the relative coverage of social impacts appears even less in some of the most recent ESs, many of which are for projects that are a long distance offshore, and several social impacts (e.g on accommodation and health) may be scoped out of the assessment from the beginning. • ESs clearly recognise the variations in socio-economic impacts over the OWF life cycle. Most include both the construction and the operation and management (O&M) stages, and increasingly ESs are including the decommissioning stage. By far the most attention is for the construction stage. Some studies make clear distinctions between the onshore and offshore activities, but for many this is not clear, and the focus is primarily on the offshore activities. This is unfortunate as the onshore can have important local socio-economic impacts. • There is only limited coverage of cumulative impacts. Several ESs do see a cumulation with other OWFs that may have significant and wider local/regional economic benefits and that that will attract investment to the region. A few others see more of a threat, putting pressure on local labour markets, and in addition having a detrimental effect on associated industries, especially tourism. A recent approach (see Norfolk Vanguard, 2018) is a recognition of a tiering of relative importance in cumulative assessment. The highest priority is given to a consideration of tier 1 projects that are likely to be under construction in the same time envelope as the project under consideration. • ESs show understanding of the statutory guidelines for the assessment of the relevant economic and social issues. This is especially the case with regard to English ESs and guidance in Energy National Policy Statements (NPSs), including NPS EN-1 (DEC 2011); see Appendix 2 of this report. However, there is little follow-up on the social content in the NPSs. • The consideration of residual socio-economic impacts is very limited in all the ESs reviewed. • There is some building on the growing number of estimates from earlier studies into later studies, but there is little monitoring evidence—other than from the Scroby Sands (see SQW 2011) and Robin Rigg early OWFs. Major developers and their consultants tend to draw on their own previous ES studies in the area. For many ESs, there is little or no mention of the monitoring of socio-economic impacts, but there are some notable exceptions coming through, as illustrated below: --- *Neart na Gaoithe*: Recommended that economic benefits are monitored for the local area and across Scotland through the keeping of records on supplies and the contracts for them, showing the source location. The data will be analysed periodically to highlight economic benefit to the study area. --- *Beatrice*: Some high level monitoring via Input-Output study that uses actual contract data, although the details of the data are not available for analysis. Also use of an innovative Social Return on Investment (SROI) approach applied to actual Community Benefits Fund data, although again the details of the data are not available for analysis, and the level of multiplier impact seems high. --- *Atlantic Array*: To ensure full economic benefit to the region, the involvement of

	local people and local businesses in the project is to be monitored. --- *Hornsea 1 and 2:* Not well covered in the ES, but importance of monitoring socio-economic impacts was stressed in the Examination process, and built in as a Requirement in the DCO for Hornsea 2. --- *Norfolk Vanguard:* It is recognised that monitoring is an important element in the management and verification of the actual project impacts. The requirement for and appropriate design and scope of monitoring will be agreed with the appropriate stakeholders and included within the final CoCP and the Construction Method Statement (CMS) commitments prior to construction works commencing. • The consideration of potential impacts on tourism of OWFs does, for some studies, make good use of tourism responses to completed OWF developments (e.g. see Navitus ES socio-economic study).
3.3 To identify key elements within economic broad headings, and specify the methodology used	*3.3.1 Overview and Methodology* • The *ES economic focus* is on employment especially, and on supply chain and GVA impacts. There is also coverage of some related sector impacts, especially on tourism and fishing for offshore works, and on agriculture for the onshore cable route. In all of the studies, there is a dominance of baseline scene - setting before the coverage of the impact assessments. • *On methodology*, there is evidence of increasing sophistication from early studies where there is only a vague description of the approach used, through to more studies using a scenario approach, and with some studies using an Input-Output modelling approach. The scenario approach is the most popular, and is used as a way of allowing for uncertainty in relation to (i) port location, especially for the construction stage, and (ii) amount of UK supply chain content. In some cases, there is also use of a 'Rochdale-envelope' worst-case scenario approach. The scenarios normally have three levels – low/medium/high – of local/regional/UK supply chain content. However, there are many interesting variations to the nature of the low/medium /high scenarios, as illustrated below. Some forecasts do usefully identify local level economic impacts : --- *Triton Knoll:* with high assuming 70-100% UK sourcing; medium 50% of high and low 10% of medium; --- *East Anglia 3:* with high assuming 55% UK sourcing; medium 35% and low 20% (latter considered worst case scenario); --- *Hornsea 1:* low impact where local ports are not used, medium impact where a local port is used and 50% of supply chain opportunities related to the construction will be locally sourced; --- *Inch Cape:* In base impact scenario a moderate supply chain capacity and whole life expenditure of 12% impacting on the economic study area, 9% for the rest of Scotland and a further 17% for the rest of the UK. With the high impact scenario, 33% local, 14% rest of Scotland and 25% rest of UK; --- *Navitus:* low (not local port), medium (local port for construction and O&M), and high (as for med + some local fabrication activity). • *Much depends on port location* and most studies tend to fudge this issue, arguing that it will depend on the specification and sourcing of key construction elements (turbines, blades etc). Some projects (eg Dogger Bank Creyke Beck) argue that the port location issue negates any detailed economic analysis.

Some ESs are a bit more specific on port location, narrowing it down to a few relatively adjacent ports (e.g. Walney potential use of Barrow, Heysham, Belfast and Liverpool; Hornsea 3 modelling Humber and East Anglia based alternatives). However, as particular ports become used for actual construction and O&M stages for live projects, the port locations for subsequent projects (often next in a sequence at a broad location) should hopefully become easier to identify in the ES (?).

- There is also the issue of *what is local and/or regional in terms of economic impact.* Some studies avoid specification altogether. Where it is included there is some focus on adjacent coastal local areas, although there is some variation in approach, as illustrated below:

  --- *Beatrice: s*tudy Area includes local authorities that border the Moray Firth: Moray, Highlands and Aberd/shire:

  --- *Triton Knoll*: uses local (part of Lincolnshire, regional (E. Midlands) and UK levels of analysis;

  --- *Inch Cape: uses* economic study area (60 mi catchment) including 4 labour market catchment areas;

  --- *Navitus:* 60 minutes' drive time catchment area; but only 10km coastal belt for tourism impacts of offshore development;

  --- *Dogger Bank Teesside:* NE region, and local Tees Valley Boroughs, UK—plus onshore cable corridor; and

  --- *East Anglia 3: which u*ses alternative regional spatial areas, around port location alternatives

3.3.2 Employment

- The *specification of potential employment associated with OWFs* is not clearly discernible from the review of the ESs. Predicted employment figures can vary widely between impact scenarios. For example, for the Beatrice project total local area job years predictions vary from 400-1800 for the construction stage, and from 3200-6000 for the total O&M stage, for low and high scenarios. For Hornsea 3, construction employment estimates range from 120 (low scenario) to 2140 (medium scenario) to 4060 (high scenario only) for Humber local area pa, giving 0.05 to 1.6 jobs per MW

- Also, for some ESs it is not clear whether the figures used are for the whole project life cycle or just for a key stage (normally construction). If for construction, is the figure for peak employment or again for total FTEs? There are also frustrating issues of which spatial level is being used, and for which scenario? One increasing area of consistency is the practice of using a Direct plus Indirect and Induced approach to employment impacts, although there is considerable variation in the size of multipliers used.

- Notwithstanding these problems, which do limit the utility of findings, the research sought to identify a range of potential local and regional employment impacts for total construction and for each O&M year, using a *jobs per project MW size approach*. These figures include Direct plus Indirect and Induced. For total construction FTEs, the forecast jobs per MW range from about 0.2 (local/low impact scenario), to about 0.5 (local/medium impact scenario) to about 1.5 (regional/medium impact scenario).

- For O&M the annual FTE per MW over the 20-25 year life of the project is much less, and may be of the order of 0.15-0.2 per MW for a regional /medium impact scenario, although some forecasts appear to be (unrealistically?) much lower than this. The 0.15 to 0.2 is somewhat lower than the O&M estimates by Oxford Economics of 0.19 Direct and 0.16 Indirect per MW (Oxford Economics/Vestas 2010), although the Oxford Economics estimate is probably for a wider than regional scale.

- Whilst there is some commonality in the Direct plus Indirect/Induced employment approach, there is *considerable variation in the multiplier ratios* used (i.e. D: ID+INDU). These vary from 1:0.3 to 1:1.5, with the mean being around 1:1, although we should expect some variations reflecting the variations in the potential of the various OWF host coastal local and regional economies to provide supply chain support.

- Almost all the ESs provide some *significance assessment of the potential employment impacts.* All construction employment impacts are assessed as positive, but perhaps somewhat surprisingly, very few ESs assess them as of major significance, with medium or minor seen as more, equally, likely to be the level of significance assessment (local and regional?). For O&M employment, assessment is in almost all cases assessed as minor positive.

- *Employment impacts' mitigation and enhancement measures* focus largely on the positive enhancement step in the mitigation hierarchy. Many of the ESs emphasise local training and upskilling measures. The following provide a flavour of some of the responses in the ESs reviewed:

  --- *Hornsea 1*: The developers have programmes of activities which seek to (i) promote career opportunities in the offshore wind sector to young people, and (ii) boost the availability of skills appropriate to the sector in the local area—through education and training initiatives;

  --- *Rampion*: employment and training plan built into the DCO; and

  --- *Walney Extension*: DONG energy apprenticeship to encourage development of local capacity and to enhance local participation and benefits.

  --- *Hornsea 3:* To mitigate the lack of skills for offshore windfarm in the local area, there is a partnership with Teach First partnership, supporting/collaborating with University Technical Colleges, establishing an apprenticeship scheme and, ring-fencing funds for skills. There are also Science, Technology, Engineering, and Math initiatives through Ørsted's voluntary Community Benefit Funds.

3.3.3 Wider economic/GVA impacts

- The i*dentification of potential wider economic/GVA impacts associated with OWFs* is covered in many of the ESs, although it is not always possible to be specific and to make comparisons based on the review of the ESs. With regard to *methodology,* there is use of a scenario approach in many ESs, as noted in s 3.3.1. Over time there has also been increasing use of guidance from sources such as of HM Treasury's *Green Book* (2013), Scottish Enterprise (SE) *Additionality and Economic Impact Assessment Guidance Note* (2008), and NPS Energy projects guidance. A few studies have used an Input-Output analysis approach to predict direct and indirect/induced economic impacts for the various OWF project stages; for example, the Beatrice study noted in s 3.2 above. Some studies have sought to refine the approach to capture more of the potential range of interactions between the project and the host economy. For example, the

more recent East Anglia 3 ES includes consideration of the following in its economic impact methodology :

(i) deadweight - what would happen in the absence of the project;

(ii) leakage: the proportion of employment opportunities accessed by people living outside the study area;

(iii) displacement; the proportion of project benefit accounted for by a reduction in benefit elsewhere;

(iv) substitution: when a firm substitutes one activity for another to take advantage of public sector assistances; and

(v) multipliers: to estimate further economic activity associated with additional income and supplier purchases.

- Many of the ESs seek to calculate the *GVA of the project*, normally for the construction stage, but sometimes also for O&M and decommissioning. However, comparisons are complicated in many cases by a lack of clarification as to spatial level and the length of time used in the analysis. A few examples of the calculated scale of total construction stage GVA are set out below. They illustrate the wide range in impacts between scenarios. Construction life is on average about two years:

  --- 580 MW Beatrice project: high (hc) and low case (lc) scenarios, from £17m D+9m ID (lc) to £63m D + £35m ID (hc) for local study area;

  --- 750 MW Walney Extension: £49m D + £15m ID for regional GVA;

  --- 1200 MW E. Anglia 3: GVA £68 m (lc) to £218m (hc) for offshore construction; £19m for onshore construction;

  --- 450 MW Neart na Gaoithe: £20 m D + £10m ID (lc) and £260 m D + £140m ID (hc)

  GVA levels are lower per annum for the O&M stage, but the longer life of this stage (c 20-25 years) increases their local significance. Further examples are provided below:

  --- 580 MW Beatrice project: high and low case scenarios, from £137 D+ £63m ID (lc) to £245m + £133m (hc) for local study area over project lifetime, giving c £10-20m pa;

  --- 750 MW Walney Extension: £11m D +£3m ID for regional GVA (assumed pa?);

  --- 1200 MW E. Anglia 3: GVA of c £14m (pa) for 25 years; and

  --- 450 MW Neart na Gaoithe: £8m D + £4m ID (lc) and £9m D + £5m ID (hc) pa for local area

  On average, these examples suggest a local/regional GVA per MW of from c £ 0.1-0.5 m for the total construction stage, and c £ 0.04m pa for the O&M stage (the latter averaging about £15-20 m pa for the total project for medium size projects; and up to £50m for very large projects). It is likely that there will be less difference between the low case and high case scenarios for the O&M stage, as there is likely to be more opportunity for local sourcing of the goods and services involved.

- Almost all the ESs provide some *significance assessment of the potential wider economic/GVA impacts.* All construction GVA impacts are assessed as positive, with medium or minor seen as equally likely to be the level of significance assessment (local and regional?), although a few ESs do see the impact as

	major. For O&M employment, assessment is in almost all cases assessed as minor positive, but with a few medium significance assessments for some larger projects. In addition, some ESs note that OWF development can boost local/regional confidence providing a very positive impact on the development potential of an area. • Several of the ESs also include discussion of the *potential impact of the project on other economic sectors, especially on tourism and fishing.* For the construction stage, the ESs assess the impacts on tourism as negative, and of minor and in some cases of medium significance. Analyses tend to draw on previous studies of the impacts on tourism of both onshore and offshore wind farms; these tend to show little impact on tourists' destination decisions (add refs). There are fewer mentions of the negative impact on fishing from the construction stage; where mentioned they are seen as minor negative, but major in one major North Sea fishing area. There are also a few minor negative mentions of the impact of onshore cable laying on local agricultural activities. The findings are similar for the O&M stage, although there is occasional mention of the potential tourism value of OWFs. • *Economic impact mitigation and enhancement measures* focus largely on the positive enhancement step in the mitigation hierarchy. The following provide a flavour of some of the responses in the ESs reviewed: --- nothing needed as all seen as positive; --- provision of supply chain events targeted at supporting local/regional firms; --- focus on shifting GVA and local employment more towards the high case scenario; --- focus on increasing local economic capacity to respond positively to opportunities; --- DONG apprenticeships; --- use of protocol to give local contractors the opportunity to tender for work arising from the project capital and operational expenditures; --- project boundary reduced to limit visual impact for tourists; --- 24 hours construction working to minimize impact on fishing; and --- *Navitus project cancelled for potential tourism/visual and landscape impacts on a World Heritage Coast.* • *A normative alternative approach?* The Norfolk Vanguard raises some scepticism about the value of income and expenditure forecasting. Here, more emphasis is placed on a normative approach, seeking to maximise the local economic benefits via development of a vigorous supply chain ecology in the local and regional business environments. That is, the focus is on managing the level of local economic impacts through working with local businesses as fully as possible.
3.4 To identify key elements within social broad headings, and specify the	*3.4.1 Overview and methodology* • The coverage of social impacts of OWFs is disappointing. Many ESs give little coverage at all. Some briefly mention social impacts, especially potential construction workforce impacts on housing and local services. A few go further

methodology used	in their coverage of demographic impacts, housing and local services impacts and impacts on local quality of life (QoL). However, even in the latter cases there is normally a lack of depth with respect to specific issues; for example of impact of projects on community demographics, cost of housing, community wellbeing (noise, increased vehicular movements, diversions etc), and crime and community cohesion. There is no disaggregation of distributional impacts on various community groups (eg young/old; M/F). Overall, there appears to be a general assumption that social impacts are not important, and many can be scoped out altogether. • Methodology is largely descriptive and qualitative, building on baseline studies of local demographics. There is a predominant use of professional judgement and comparative studies. Social impacts are seen as deriving from the economic and environmental conditions, and are regarded as difficult to assess directly. Economic impacts, especially employment, are seen as a measure of social impacts. • In several studies, there is little evidence of the role of public participation to assess such impacts, yet this is important for socio-economic issues. However there is some evidence in a few studies—eg Inchcape and Navitus Bay. For the latter, there was evidence of consultation with both the local community and visiting tourist community with regard to the possible impacts of the visual perception of the proposed development. This constituted a major impact issue; however overall, surveys showed that the presence of Navitus OWF was unlikely to have a strong bearing on whether visitors decide to visit/not to visit the area again; only 14% thought they might be put off making future visits. • Evidence of appropriate stakeholder consultation is a requirement under the English national infrastructure regime. For example, the Norfolk Vanguard ES reports considerable consultation work with local community/local stakeholders. "The project employed a Local Liaison Officer and Skills and Education Champion based in Norfolk, as well as procured support from a Norwich based Public Engagement agency. The project has continued to deepen and broaden engagement with organisations that support and represent the interests of people and businesses local to landfall, onshore cable route, onshore project substation and National Grid substation, and in the region". *3.4.2 Range and significance of social impacts* • For the construction stage, there was some mention of potential impacts of the workforce on housing and local services, and occasional mention of impacts on community cohesion and QoL; some of these comments related to onshore works, including the disturbance of the construction of substations and cable laying. In most cases, the ESs assessed significance as minor and negative. However, some studies also identified potential positive impacts, including enhanced training opportunities and demographic shifts with the attraction of more young people into the host area. • For the O&M stage there was even less coverage of social issues, other than some limited mention of continuing visual impacts (negative/minor) and upskilling opportunities (positive/minor). A likely future topic, which was surfacing in recent studies, was the opportunity for community benefits initiatives (see s 3.6 below). • As noted above, the potential visual impact of OWFs on tourism is a topic of some concern, and is raised in a number of studies. But, as noted in s 3.3.3,

	analyses draw on previous studies of the impacts on tourism of both onshore and offshore wind farms, and these tend to show little impact on tourists' destination decisions (add refs).
3.5 To identify the relative coverage of socio-economic impacts in the various stages of the OWF lifecycle	• The focus in the ESs is clearly on the impacts of the relatively short construction stage, and mainly the offshore element of construction. There is very little on the socio-economic impacts of the onshore elements of construction, although these can be the most disruptive for the local population. However, the sites selected for the onshore base sub-station may be isolated from communities and this can mitigate negative impacts. • There is a growing consideration over time of the O&M stage of the OWF life cycle. Although O&M employment numbers may be low, especially compared with the construction stage, it is likely that the various O&M activities are more accessible to local people; they also have a 20-25 year life. • The socio-economic impacts of decommissioning are only thinly covered in several studies, if at all. However, the potential impacts of decommissioning do receive more regular, and indeed quite detailed, coverage in many of the later studies.
3.6. To identify trends over time.	• As noted in s 3.1 all the ESs reviewed to date include a section on socio-economic effects, and such content appears to be a given and accepted feature of UK OWF ESs. There is considerable variation in length of coverage. The content in the more recent ESs is normally in the range of 50-100 pages, but precision is difficult, as some studies have additional appendices, and extra sections sometimes required by examination bodies. Of course, length of coverage does not always equate with depth and quality of coverage. • Economic impacts continue to dominate the content over time, perhaps increasingly so. Later studies tend to be for larger projects, several of them well offshore into the North Sea. Whilst they have good coverage of economic impacts, there is no improvement on earlier studies on social impacts. Indeed, for some studies, there is very little social content at all. This may reflect 'an out of sight out of mind' approach. • As noted above, there is probably a shift towards a quantitative economic assessment, covering construction, O&M and decommissioning stages of the OWF life cycle. Scenario approaches dominate the methodology, and there is some limited use of input-output modelling. There is probably somewhat more focus in later studies on identifying local/regional impacts, although studies still suffer in many cases from a lack of clarity on scale and timing of impacts. • In terms of social impact, a trend in recent years is the adoption post ES/examination/decision on the provision of a Community Benefits Fund (CBF) to support local communities. The one used for the Beatrice project provides one example: --- The CBF, established in 2016, has an available total of £6m, split between Highland (£4m) and Moray (£2m), and equally between a Beatrice Partnership Fund (BPF) and a Local Fund for each area (ie £1m Partnership Fund and £1m Local Fund for Moray). The community fund is in addition to the £28m that BOWL is paying into the Crown Estate's Coastal Community Fund as part of its seabed leasing agreement.

3.7. To explain variations in ES consideration of impacts (e.g: more coverage for larger projects; any variations according to distance from shore?)	• At this stage, it is unclear if there is any correlation in the intensity of impact and the nearness of the project to the shore. What is clear however is the correlation in choice of port and the likely intensity of impact on the community; the port community is likely to be the most impacted by the project. However, the unwillingness of developers to specify the construction port base(s) weakens the utility of many assessments. But, as particular ports are used for actual construction and O&M stages for live projects, the port locations for subsequent projects (often next in a sequence at a broad location—e.g. Hornsea 1, 2 and 3) may hopefully become easier to identify in the ES. • With regard to any correlation of size of impacts with size of projects, it is hard to draw any clear conclusions, even with quantitative employment and GVA data. Big projects generate more jobs and more GVA, but there can be wildly varying impacts between high case and low case scenarios. The calculation of ratios of jobs per MW are only of limited help in this regard.
3.8. To identify evolving approaches to methodology – e.g. from expert opinions to more modelling approaches; and limitations of such approaches	• As noted above, scenario approaches dominate the methodology, partly tied to port alternatives. This makes forecasting of socio-economic impacts, especially for the construction stage, difficult, as there are often very big variations in impacts under different scenarios. In addition, scenario assumptions are not always clear. • There has been some shift from expert opinions to more quantitative methods for economic assessment, including the limited use of use of input –output modelling. However, expert opinions dominate the approach to any consideration of social impacts. • There is also increasing use of background publications, such as the Crown Estate (2012) document providing economic data on the various elements of an OWF and the work of BVG Associates [e.g BVG (2016), Strategic review of UK East Coast staging and construction facilities).
3.9. To identify changing importance of mitigation, enhancement and monitoring measures over time.	• The ESs are limited on consideration of mitigation and enhancement measures. However, there is some evidence of a growing focus on the provision of incentives to get the community involved in the project through, for example, training and educational incentives aimed at up-skilling and training in the local communities. There is also increasing use of special initiatives/protocols for local businesses to get involved in the supply-chain for the project. • Mitigations/enhancements are more oriented towards enhancing economic gains and less towards social well-being *(although having a job can bring all kinds of social benefits).* With regard to cumulative socio-economic impacts across projects, coverage is partial with some limited recognition of the need to mitigate potential pressures on local labour demand, but more on the potential enhancement opportunities for delivering significant wider local/regional economic benefits in combination with other local OWFs. The importance of a tiering approach is being recognised as a way of managing the growing number of OWFs, especially in the North Sea. • There is little evidence of monitoring in most of the ES reviewed so far. However, see s 3.2 for some good intentions. For some ESs, it seems there may be an assumption that when project impacts are beneficial or positive, there is no need for monitoring, yet positive predictions may not be achieved

	• There is some advantage for some projects in drawing on earlier projects in the same area, although surprisingly there is little or no evidence of any systematic monitoring of earlier projects to assist in this (*although difficult if not yet under construction*). Recent English ESs are moving towards the good practice inclusion of a requirement for an *Employment and Skills Plan*, or equivalent, to support effective implementation of socio-economic undertakings (predominantly economic). See Appendix 3 for an example from the Hornsea 2 project. • There is growing use of public consultations as a means of mitigating community disruptions to business and movement?
3.10. To consider, document and explain any international variations in experience from comparison between UK and EU cases; may also be between English, Welsh and Scottish cases?	• Most of the UK ESs use the same statutory framework and guidelines (English National Infrastructure regime, or the Scottish Planning system for Scottish projects). The English studies make increasing reference to Energy NPS (EN-1) guidance, although interpretation varies in practice. • There is not enough evidence to date to suggest any major geographical variations of approach in UK ESs, although the Scottish ones do appear to predict more substantial local/regional economic benefits, with more use of I-O type methodologies. • *Comparisons with other EU studies*. It appears that socio-economic impacts, in terms of topics covered in this report (especially employment, GVA, wider economic development and supply chain, demography, housing, local services and community wellbeing) are much more fuller discussed in UK ESs than in ESs for OWFs in the other EU countries examined for this project. These other countries include Denmark, Ireland, Netherlands, Belgium and Sweden. Indeed, ESs in these other countries cover socio-economic impacts very thinly, if at all. Where there is some overlap is in the potential impacts of OWFs on other economic sectors, especially on tourism and fishing. • *Variations between developers and consultants.* As noted in s 3.1, a number of major consultancies have been involved in undertaking the socio-economic studies, including Royal Haskoning and RPS. Sometimes, and with a growing trend, there is subcontracting of socio-economic content to firms that specialize in this field, such as Regeneris, Arcus and SQW. The various consultancies tend to roll-on their particular approach between studies. Whilst there is little evidence of learning from the monitoring and auditing of previous studies, there is some evidence of a developing of approaches.
3.11 Best practice — learning from current ES practice to improve future practice.	• *Use an integrated chapter approach*, which includes both socio-economic impacts (employment, economic development, housing, local services etc), and key economic sectors (especially tourism and fishing). The chapter should also bring together impacts of onshore infrastructure (e.g. sub-stations and cable corridor) and offshore infrastructure (turbine cluster, cable array etc). • *Include consideration of all the impacts noted above for the key stages of the project lifecycle* (i.e. construction, O&M, and decommissioning). Construction impacts should be both for the peak construction year, and for the total construction period. O&M impacts should be for the normally envisaged annual impact over the 20-25 year O&M life. • *Include consideration of all the impacts noted above for the key spatial impact levels: local, regional and nation-wide*. Clearly define the spatial levels. Local will

	normally include relevant coastal local authority areas within about a 60 minutes commute to the likely construction port base. • *Every effort should be made to narrow down the port options*, preferably to one! The relative probability of using any alternatives should be set out. • *Guidance and overall impact assessment methodology*. Specify key guidance documents (e.g. Energy NPS guidance on socio-economic impacts; Treasury Green Guide; industry) and in the impact assessment refer to coverage of the guidance. Where the methodology uses scenarios, clearly set out the logic and assumptions underpinning each scenario. Levels of significance (simple scale, and either positive or negative) should be attached to all assessments. Keep the number of scenarios to an absolute minimum, and specify a most likely scenario. Whilst baseline context setting is important, it should be targeted, and should not swamp out the impact assessment. • *Economic impacts* will normally include employment, GVA and specific sector impacts, for each project stage, time-period and spatial level, as discussed above. Offshore and onshore impacts may be calculated separately, but should be combined to produce total impacts. Sector studies should be included here. Impact predictions for employment and GVA should include clearly identifiable Direct, Indirect and Induced impacts. If an Input-Output/other form of modeling is used, relevant calculations and assumptions need explanation. • *Social impacts* should be covered whatever the distance from the coast of the OWF. They will normally include demographic, housing, local services, and wellbeing/QoL impacts. As for the economic impacts, these should be for each project stage, time-period and spatial level, and should include both offshore and onshore impacts. However, social impacts are likely to be more qualitative than the economic impacts. Any visual perception studies, for near coast locations, should be included here. • *Cumulative assessment is important,* and should be included. However, the potential combination of scenarios involved can complicate assessment; the use of tiered assessment is away forward here. With more decisions on port locations, with their associated OWF- support infrastructure, it may be possible to narrow down the range of the scenarios. • *Monitoring* of socio-economic impacts in both construction and O&M stages is also important to check on the predictions, and the implementation of mitigation and enhancement undertakings associated with the permission to build. The good practice inclusion in development permissions for an *Employment and Skills Plan*, or equivalent, to support effective implementation of socio-economic undertakings (predominantly economic) is recommended. See Appendix 3 for an example from the Hornsea 2 project.

References

BVG Associates (2016), *Strategic review of UK East Coast staging and construction facilities,* Swindon: BVG
BVG Associates (2019), Guide to an Offshore Wind Farm, Swindon: BVG
HM Treasury (2018), *Green Book*, HMG: London
Scottish Enterprise (SE) (2008), *Additionality and Economic Impact Assessment Guidance Note*
Plus all the ESs and relevant socio-economic chapters (as available) for all the reviewed OWFs:

Appendix A (extracted from IAU ES reviews and from original ESs)

A1 Overall, and largely qualitative, assessment

Project; MW size; distance from coast **Consultant and developer**	**ES date**	**SEI number of pages**	**Economic: social impacts—balance of coverage**	**Key economic topics**	**Key social topics**	**Other impacts e.g. cumulative?**	**Others e.g monitoring**
Blyth Demonstration : 42MW; 6km; NAREC for EDF Renewable Energy	2010	17	Economic focus; no assessment of significance of social impacts	Jobs, and supply chain impacts. Plus some focus on impacts on fishing and tourism.	Very little, although see as overall positive	Noted, but not seen as significant	Overall, a limited analysis, with no stage- by- stage analysis.
Kentish Flats; 50MW; 9km; Royal Haskoning for Vattenfall	2011	26	Some limited coverage of both economic and social	Some focus on impacts on fishing and tourism; also potential navigation impacts noted.	Very little, but potential - ve impacts on housing and local services	May have significant wider local/regional economic benefits in combination with other local OWFs	Overall, another limited analysis –but some stage- by- stage analysis. Monitoring proposed for navigation impacts.
Galloper; 353MW; 30km; Royal Haskoning for Galloper Windfarm Development	2011	30	Some coverage of both economic and social, but more on economic	Jobs especially, and supply chain impacts. Plus some focus on impacts on fishing and tourism—both of which are important local industries..	Limited, but potential influx of workers on local infrastructure.	No overlap with other local projects envisaged	No SIE monitoring proposals
Rampion: 400 MW; 20km; RSK Environmental for EON	2012	85	Some coverage of both economic and social, but more on economic	Jobs especially, and supply chain impacts. Also some focus on impacts on fishing and tourism—both of which are	Impacts on housing and community cohesion	Some concern about potential impacts with other possible OWF projects	PRoW reinstatement to be monitored for an agreed period of time. During construction, a hotline will be in place to monitor complaints and

				important local industries.			respond accordingly.
Neart Na Gaoithe; 450MW; c20km; consultant unknown for Mainstream Renewable Power	2012	21	Largely economic impacts based.	Focuses are jobs and GVA.		Growing number of windfarms in the region might provide a +ve cumulative effect that will attract investment to the region.	Recommended that economic benefits are monitored for the local area and across Scotland through the keeping of records on supplies and the contracts for them, showing the source location. The data will be analysed periodically to highlight economic benefit to the study area.
Beatrice; 580MW; 13km; Arcus/SQW for SSE	2012	60	Largely economic impacts based	Focuses are jobs and GVA.	Some reference to social, but very thinly covered.	Cumulative effects are briefly covered in relation to other projects (eg. other N. Sea wind farms, oil and gas projects and port and harbour developments) , but more fully in terms of cumulation of various elements of the project itself—especially the wind farm and offshore transmission	Some high level monitoring via the recent I-O study which uses actual contract data, although the details of the data are not available for analysis. Also innovative Social Return on Investment (SROI) approach applied to actual Community Benefits Fund data, although again the details of the data are not available for analysis, and the level of multiplier impact seems high
SeaGreen Alpha; 750 MW; 27km; Arcus for SSE	2012	37	Mainly focused on economic impacts	Jobs, supply chain effects, and tourism		Cumulative effects are briefly covered in relation to other projects (eg. other N.	No clear monitoring plan

						Sea wind farms—e.g Neart Na Gaoithe; Inch Cape; Bell Rock and Forth Array)	
Triton Knoll; 869MW;40km; RPS/Roger Tym and Partners for RWE	2012	25	Mainly focused on economic impacts, but some limited consideration of social impacts	Jobs, supply chain effects, wider catalytic economic impacts and tourism	QOL during construction, community facilities and housing	Consideration of impacts of several projects in the area; -ve re QOL, and pressure of jobs, but also +ve re skill development	Identified recreational activities in the project area should warrant some monitoring, however, no clear monitoring plan is included.
E Anglia 1; 714MW; 43km;Roger Tym and Partners for Vattenfall/Scottish Power	2012	85	Again economic focus, but some limited consideration of social impacts.	Jobs; economic activity; GVA	Education and training; community services and housing	Cumulation of energy projects off E. Anglia and Lincs coast may put pressure on local workforce and services	Given the range of impact estimated at minor to moderate beneficial impact, a monitoring mandate should be included but this was not clearly stated.
Atlantic Array; 1200MW; 15km; RWE and Innogy	2013	c160	Again economic focus, but some consideration of social impacts.	Jobs; supply chain; GVA	Esp housing and local services	Significant economic benefit in cumulation with other wind farm projects, but threat to recreation and tourism	To ensure full economic benefit to the region, the involvement of local people and local businesses in the project is to be monitored.
Burbo Bank; 258MW; 7km NIRAS and RPS for DONG	2013	76	Again economic focus, but some consideration of social impacts	Impact on employment, (GVA), and on local tourism and recreational activities	Housing, community facilities and QOL	Minor cumulative impact issues, with other OWFs, on tourism (visual impacts)	Not included
Hornsea 1; 1200MW; c115km Regeneris for DONG/Smartwind	2013	72	Again economic focus, but some consideration of social impacts	Impact on employment, (GVA), business sectors, and on local tourism and recreational activities	Measures of community vitality and viability (e.g., changes in demand for local housing, accommodation and services)	Consideration of impacts of overlap with Hornsea2 and Dogger Bank OWF projects, re labour demand and resultant pressure on accommodation and other community facilities	Not well covered in the ES, but importance of monitoring socio-economic impacts was stressed in the Examination process

Walney Extension; 750MW;14km Regeneris for DONG	2013	75 + 12p Appendix	Focus on the local and regional socio-economic changes that the project will potentially bring to the area.	Employment and GVA	Impacts on local; infrastructure	Limited overlap in time with any other project of the same magnitude in the region	Recommends regular consultation with relevant local authorities and departments to enhance mitigation on movement in the community and monitor tourism activities/businesses.
Dogger Bank Creyke Beck; 1200MW; 148km. Royal Haskoning for Forewind	2013	47	Primarily economic focus, with very limited coverage of social impacts.	Mainly employment	Little coverage	Little coverage but mention of potential for regional cumulative benefits from several North Sea OWFs	Other than any mitigation measures to forestall any negative impact of in-migration, there are no clear indications of any monitoring or enhancement measures for the socio-economic receptors.
Inch Cape; 784MW;15km Repsol for Redrock Power	Undated?	c90 (offshore and onshore)	Primarily economic focus, with very little coverage of social impacts	Mainly employment and GVA	Mention of EMP	Considerable discussion of cumulative effects with other potential Scottish OWFs, ranging from minor to medium according to location—re labour demand impacts	
Navitus; 630-970; 10km Navitus Bay Development Ltd - EDF Energy Renewables and Eneco Wind B.V	2014	82	Primarily economic focus, with very little coverage of social impacts	Mainly employment and GVA		There are a number of proposed projects for development in the study area; but the cumulative impact is estimated to be minor and negligible.	Not included
Dogger Bank Teesside; 1200 MW; 200km	2014	50	Primarily economic focus, with very limited coverage of social impacts. Includes onshore and offshore.	Mainly employment	Little coverage	Little coverage but mention of potential for regional cumulative benefits from	As for Creyke Beck

Royal Haskoning for Forewind						several North Sea OWFs	
E Anglia 3; 1200MW; c70km P Brett/R Haskoning for Vattenfall/Scottish Power	2015	74	Mainly economic.	Employment, and GVA especially.		Some consideration of potential other projects (eg SZC), with up to 12000 construction jobs in total, but argued that there is available workforce capacity in the region.	Not covered
Hornsea 2; 1400MW; c100km RPS-Regeneris for Dong/Orsted	2015	95	Again economic focus, but some consideration of social impacts	Employment creation; GVA; impact on specific business sectors – including tourism, fishing and agriculture	Measures of community vitality and viability (e.g., changes in demand for local housing, accommodation and services)	Consideration of impacts of overlap with Hornsea 1 and Dogger Bank OWF projects, re labour demand and resultant pressure on accommodation and other community facilities –but depends on whether happening at same time	No provision in DCO, but required by the ExA, although weakly covered in the DCO
Moray East (aka Stevenson, Telford and McColl) c1100MW 30k offshore Royal Haskoning for EDP Renovaveis and Engie	2016	233	In addition to socio-economic assessment, other topics such as fisheries, shipping and navigation, recreation and tourism, and transport also fall under remit of impact on the human environment. The key areas that are the focus of the SEIA are: changes in expenditure within the local economy; changes to local employment patterns; economic impacts on other marine users; and Impact on educational opportunities (i.e again primarily economic)			Collaborative approach with other OWFs in the area , and with Crown Estate, re joint consultation and standardized approaches to the EIA for all the stages of the project	Periodic monitoring through surveys is proposed and approved for (?)
Hornsea 3; 2400MW; 120km offshore	2018	95, spread over several chapters	Still primarily economic focus, but the scope of the socio-economic impact for this potentially huge OWF	Employment creation; GVA; impact on specific business	Measures of community vitality and viability	The cumulative assessment methodology for Hornsea	No provision at all in ES socio-economic chapter

Regeneris for Orsted			extends from landscape and visual impacts to historical environment, land use, agriculture and recreation, traffic and transport, noise and vibration, air quality and health, and economic parameters within the study area—Humberside and New Anglia LEP areas..	sectors – including tourism, fishing and agriculture	(e.g., changes in demand for local housing, accommodation and services)	Three advises the use of Tiers for the assessment to reflect the differing potential for projects to come forward. While there are 21 projects identified for the assessment, only six (Tier 1) have the potential to overlap with Hornsea Three during the construction phase Within the southern North Sea area projects could act collectively with Hornsea Three to affect shipping and navigation receptors. Also the use of ports in the area for O&M is another issue that may require focused analysis to underscore the possible changes the increased movement and activities in the location may bring. In economic terms, the cumulative impact is reported as major and beneficial.	

Norfolk Vanguard/ East Anglia Array 1800 MW; c65km offshore Royal Haskoning for Vattenfall	2018	94 pages, over 5 chapters	An agreement with stakeholders was made; that the issues of housing and health should be scoped out; this is due to limited only influx of workers. Focus on effects on tourism; regional labour market due to job creation; effect on community infrastructure.	Attention was mostly on job creation over the three project stages; and supply chain impact. Assessment covered direct economic impact, indirect economic impact, induced economic and wider economic impact (catalyst) at different level of economic sensitivity (high, medium, low, and negligible) and significance (high, moderate, low, and negligible).		Potential cumulative advantages of developing local skills and supply chain base to serve multiple projects	It is recognised that monitoring is an important element in the management and verification of the actual project impacts. The requirement for and appropriate design and scope of monitoring will be agreed with the appropriate stakeholders and included within the final CoCP and the Construction Method Statement (CMS) commitments prior to construction works commencing.

A2. Quantitative assessment: economic – employment (primarily local and/or regional)

Project; ES date	**Methodology**	**Construction: jobs/MW**	**Direct/Indirect and Induced ratio**	**Significance assessment**	**O&M: jobs/MW**	**Significance assessment**	**Mitigation and enhancement measures**
Blyth 2010	Scenarios of UK content	Hard to be clear: 50 local jobs—c1.2 per MW	1:0.3	Jobs –Minor; Fishing and Tourism - Major	No info.	No info	Nothing—as all seen as positive?
Kentish Flats 2011	Descriptive, relying on previous study	No data	No data	Jobs not assessed. Minor impact (-ve) on tourism and fishing	No info	No info	
Galloper 2011	Uses NI guidance re s-e subjects; and Rochdale envelope worst case scenario	Estimated 850 (during the construction) altogether; giving 2.4 per MW. Also 250 local jobs –	No data	Jobs—minor (+ve). Minor impact (-ve) on tourism and fishing	Est 50 giving 0.14 per MW	No info	Some mitigation proposals especially re disturbance to local farmers from onshore activities, and recreational

		giving 0.7 per MW					boat users from offshore activities.
Rampion 2012	Makes useful split between onshore and offshore impacts	Estimated 400 persons involved in different activities for the construction stage over a period of 28 months, for the onshore aspect. For offshore : Construction vessel = 500 Commissioning support- 180 Total = 680 for the offshore lasting 2 to 3 years. Therefore Onshore + offshore = 1080 Jobs giving 2.7per MW.	No Data	Jobs--Medium (+ve) Offshore works impacts on Tourism, Fishing and Navigation– Major (-ve)	No Data	Jobs-- Medium (+ve) Others-N/S or minor(-ve) Potential +ve impacts on port development	Employment and training plan built into the DCO. Cable route is diverted away from population Centre.
Neart Na Gaoithe; 450MW; c20km 2012	Some use of economic modelling. Impact area of 5 LAs. Use of low and high case local scenarios re local area's supply chain capabilities. Some Very high scenario figures raise questions.	Estimated 357 direct and 177 indirect local area construction jobs (low case), giving c1.2 jobs per MW	2:1	Medium (+ve)	1143 d and 963 id, for life of project, giving 5 jobs per MW, or 0.25 jobs per MW over project lifetime.	Minor (+ve)	Overall seen as medium (+ve) on local economy. No mitigation is deemed to be required for GVA and employment as these are considered have positive impact.
Beatrice; 580MW; 13km 2012	Includes onshore and offshore. Use of low and high case local scenarios re local area's supply chain capabilities. Some use of I-O modelling Study Area includes Las	Estimated 130 direct and 90 indirect/induced local area construction jobs (low case), giving c0.4 jobs per MW. 450 +300 for high case giving c1.3 jobs per MW	1.5:1	Major (+ve) Also estimated minor (-ve) impact on leisure tourism and minor +-ve) impact on business tourism	Estimated 60 direct and 50 indirect/induced local area O&M jobs (low case), giving c0.2 jobs per MW pa. 120 +90 for high case giving c0.4 jobs per MW	Major (+ve)	The ES concluded that, as there were not negative impacts above minor, mitigation measures for socio-economic impacts were not required.

	that border the Moray Firth: Moray, Highlands and Aberd/shire				Total jobs over O&M lifetime—low case 1800+1400 giving 5.5 jobs per MW. Or c0.25 pa.		
Sea Green Alpha	Uses local, regional, and UK wide scales of analysis. Use of low and high case scenarios.	The estimated construction jobs (for one year of construction) is 458 person years			Uses Oxford Economics estimates of 0.19 Direct jobs per MW and 0.16 Indirect—giving c 280 jobs (pa?)		
Triton Knoll; 869MW;40 km; 2012	Uses local (part of Lincs), regional (E. Mids) and UK levels of analysis. Also high, med, low impacts scenario approach—with high assuming 70-100% UK sourcing; med 50% of high and low 10% of medium	Est for E. Mids regional level construction 300 FTE/860 = 0.34 FTE per MW installed (over the construction period)		Medium (+ve)	For the operations and maintained stage; 500/860 = 0.58 FTE per MW installed (or 0.02 for each year?; and for the decom stage 650/860 = 0.76 FTE per MW installed	Minor (+ve)	
E Anglia 1; 714MW; 43km; 2012	Good coverage of project stages; 3 spatial levels (N/R/L); and onshore and offshore impacts. Also scenario analysis	674 construction jobs over the construction period. Giving 0.94 jobs per MW	285:229 1: 0.80	Major (+ve) for direct employment; and Medium (+ve) for indirect/induced	100 FTE pa giving 0.14 job per MW	Moderate temporary (+ve) Construction. Minor O & M minor ongoing (+ve) residual impact.	Focus on upskilling and training, and increasing local economic capacity to respond positively to opportunities
Atlantic Array; 1200MW; 15km; 2013	Scenario approach based on whether port and some assembly activities were in or outside the Severn Estuary.	760 construction jobs pa giving 0.633 jobs per MW.	1:1.2	Minor (+ve) for jobs Med(-ve) on tourism and recreational fishing	230 FTE employment pa giving 0.19 job per MW.	Minor (+ve) for jobs Minor (+ve) Med(-ve) on tourism and recreational fishing	
Burbo Bank; 258MW; 7km; 2013	Use of scenarios analysis mainly at	Just one forecast (whatever port). 405D plus 135	1:0.3 Surprisingly low for	Med (+ve)	Just one forecast (whatever port). 35D + 20	Minor (+ve)	

	regional level (NW/N. Wales). Several alternative ports considered. Used NI guidance.	ID/IND jobs. 2 per MW at regional level	industrial region		ID/IND jobs. 0.2 per MW at regional level.		
Hornsea 1; 1200MW; c115km; 2013	Use of extreme range of scenarios (low/med/ high). No port specification—major issue. L/R/N levels of analysis	160D+ 240ID for low scenario (local?) –giving 0.3 jobs per MW in construction (total). 50+70 pa giving 0.1 per MW. For med scenario 1240+2280 – giving c6 jobs per MW in total; and 350+650 giving 0.8 per MW pa.	1:1.5	Minor (+ve)	4D+4ID for low scenario – giving c 0.01 jobs per MW O&M pa. For med scenario—223+85 giving 0.25 per MW.	Minor (+ve)	The developers have programme of activities which seeks to (i) Promote career opportunities in the offshore wind sector to young people (ii) Boost the availability of skills appropriate to the sector in the local area—through education and training initiatives.
Walney Extension; 750MW;14 km; 2013	Potential ports for construction: Barrow, Liverpool, Heysham, and Belfast. Use of max adverse effects scenario, applied to L/R and N levels. .	Regional level: 230D+95 ID giving 0.8 jobs per MW pa; or 925 +365 giving 1.3 MW over construction period.	1:0.4	Minor (+ve)	185D+75ID over 25 year O&M period, giving 0.3 per MW; or 0.01 per MW pa	Minor (+ve)	DONG energy apprenticeship to encourage development of local capacity and to enhance local participation and benefits.
Dogger Bank Creyke Beck; 1200MW; 148km; 2013	Single and double project scenarios and Rochdale worst case. Assessments made with reference to relevant NPSs.	Construction stage jobs estimated at 436 FTE for Yorkshire and Humberside region, and c 200 ID; giving 0. 5 FTE per MW installed capacity for the single project scenario.		Minor (+ve)	For region-- 792 FTE D and ID jobs, giving 0.6 per MW over life of project; or about 0.03 per MW pa.	Minor/negligible (+ve)	
Inch Cape; 784MW;15 km	Use of economic study area (60mi catchment) including 4 labour market	For study area offshore project: 200 D+267 ID (base scenario) to 630:810 for high impact scenario	1:1.3	Minor (+ve)	For study area offshore project: 49 D+68 ID pa (?) (base scenario) to 70:99 for high impact	1:1.3 Minor (+ve)	

	catchment areas	For onshore project –c40 local jobs for 12-18 months			scenario. Allows for displacement factor reducing D jobs. For onshore project—negigible/unmanned.		
Navitus; 630-970; 10km; 2014	60 minutes' drive time catchment area; but only 10km coastal belt for tourism impacts of offshore development.	1300 offshore and 350 onshore jobs in the UK at peak construction; but locally 55 (low scenario) and 200 (med scenario) i.e 0.06-0.2 per MW for local impacts		Minor (+ve)	455 offshore job FTE years, (17 pa) for low option; c4600 for med option (185 pa)	Minor (+ve)	To maximize the opportunity for local businesses to bid for contracts; and for local employment opportunities Create access to local training need and delivery plan. Develop a supply chain strategy that will benefit the locals Continuous consultation with stakeholders. Develop a plan to engage registered fishing vessel during down-time in fishing due to the project Provision of a visitors centre in the local area.
Dogger Bank Teesside; 1200 MW; 200km; 2014	Levels of assessment: NE region, and local Tees Valley Boroughs, UK—plus onshore cable corridor. As for Creyke Beck-- Single and double project scenarios and Rochdale worst case.	For single project scenario –436 D and 588 ID total FTE jobs for NE region. c0.9 per MW	1:1.3	Minor (+ve)	For single project scenario –396 D and ID jobs for NE region. C 0.3 per MW, using local port (eg Hull). Not clear if total FTE or (more likely pa?)	Minor (+ve)	The FTE estimates are unclear at times re areas and timescales involved.

	Assessments made with reference to relevant NPSs.						
E Anglia 3; 1200MW; c70km; 2015	Good coverage of project stages; 3 spatial levels (I/R/N); and onshore and offshore impacts. Also scenario analysis: with high assuming 55% UK sourcing; med 35 % and low 20% (latter considered worst case scenario)..	For low impact, regional (E. Anglia), 356 potential offshore jobs, adjusted by displacement factor, and then multiplier* of 2.36 to give total impact of 800 (0.67 per MW) For onshore jobs *Based on CEBR Report 2012 Estimated 285 jobs needed to construct cable route, of which 97 will be retained in region, with multiplier of 2.4 giving total of 229 (0.2 per MW) pa? Use of gravity model (based on accommodation supply) to distribute the numbers in regional spatial areas, around port alternatives.	1:2.36	Medium (+ve)	Approximately 160 net additional jobs for E. Anglia (D+ID); =2.4	Medium (+ve)	
Hornsea 2; 1400MW; c100km RPS-Regeneris for Dong, Orsted	Good coverage of project stages; mainly 2 spatial levels (I/N); and onshore and offshore impacts. Local level includes Humberside coastal districts. Use of 3 scenarios (L/M/H) impacts.	For low scenario, c100 local area jobs pa; for medium c900; to 2000 for High! Giving from 0.07 to 0.6 to 1.4 jobs per MW	1:1.5	Med (+ve)	Ranges from 9 jobs pa for local impact area under low scenario, to 450 under medium scenario! Giving from 0.01 to o.3 per MW. (is this pa?) 1:0.3-0.8 dir:ind depending on scenario	Minor/Negligible (+ve)	

	Low—little use of local ports; Med – considerable use of local ports; High – as Med, plus considerable local supply chain capacity.						
Moray East 2016	Employment estimations are made by pro-rating assumptions on the bases of details from similar projects (like number of turbines, scale of energy generation). Unclear whether estimates are for FT or PT jobs.	Peak employment predictions range from 254 – 1,601 jobs within the study area and 978 – 2,641 jobs within Scotland. Giving between c 0.25 - 1.6 jobs per MW installed, jobs per MW installed for the local study area.		Major (+ve)	Peak year employment of 166 – 267 jobs within study area, giving 0.2 to 0.28 jobs per MW.	Major (+ve)	
Hornsea 3 2400MW; 120km offshore Regeneris for Orsted	Good coverage of project stages; mainly 2 spatial levels (Humber and New Anglia LEPS Local level) and National level. Use of 3 scenarios (L/M/H) impacts. Low—no use of local ports; Med – considerable use of local ports – including for laydown and High – considerable use of Humber ports, including for local sourcing (fabrication and supply chain).	From 120 (low scenario) to 880 (med scenario) for New Anglia local area pa, giving 0.05 to 0.35 per MW. From 120 (low scenario) to 2140 (med scenario) to 4060 (high scenario only applies to Humber) for Humber local area pa, giving 0.05 to 1.6 jobs per MW	Roughly 1:1	From Minor (+ve) to Major (+ve) depending on which scenario used	For New Anglia, from 0 Dir and 3 Ind (low scen), to 120 Direct and 500 Ind (high scen) (high multiplier!). Same for Humber (high multiplier!)	From Minor (+ve) to Major (+ve) depending on which scenario used	To mitigate the lack of skills for offshore windfarm in the local area, a partnership with Teach First partnership, supporting/collaborating with University Technical Colleges, establishing an apprenticeship scheme and, ring-fencing funds for skills. Science, Technology, Engineering, and Math initiatives through Ørsted's voluntary Community Benefit Funds.

Norfolk Vanguard	The use of scenario analysis is limited to the worst- case scenario. The assumptions are specific to each receptor; for example for job creation; employment leakage of about 70% to in-migration is assumed for the worst case for job creation. Use of 90 mins local commuting impact zone. New Anglia LEP	Detailed estimates of potential local jobs for both onshore and offshore activities. For onshore, estimated 244 FTE (c 50% of total) plus 219 indirect spread largely over two years. For offshore, estimated 600 FTE pa over 2 year period.	400+200 (i.e 1:0.5) 244+219 (i.e 1:1) Total: 644+419 i.e c 0.5 per MW	Minor Direct (+ve) Medium Indirect (+ve)	Used a method of estimating the number of jobs against the number of turbines for the O&M stage See BVG estimates 220 Direct +88 Indirect (pa?) giving c 0.2 per MW	Minor (+ve)	Upskilling to meet the requirement for the jobs

A3. Quantitative assessment: economic – GVA etc

Project	**Methodology**	**Construction: GVA**	**Direct/Indirect and Induced ratio**	**Significance assessment**	**O&M: GVA**	**Significance assessment**	**Mitigation and enhancement measures**
Blyth 2010	Not covered other than very descriptively.						Nothing—as all seen as positive
Kentish Flats 2011	Not covered other than very descriptively			Minor impact (+ ve) re supply chain			Supply chain event
Galloper 2011	Not covered other than very descriptively	Listing of project materials etc helps evaluation of potential local, regional etc sources.		Minor impact (+ ve) re supply chain. Medium re boosting local confidence.		Minor impact (+ ve) re supply chain. Medium re boosting local confidence.	Full and continued consultation with landowners, Compensation, protection of topsoil, reinstatement of field drains
Rampion 2012		Important opportunity for local businesses	No Data or value provided to show the potential	Major (+ve)	No Data or value provided to show the potential	Medium (+ve)	?

			GVA of the construction of this project to the Region or the local area.		GVA of the O&M of this project to the Region or the local area.		
Neart Na Gaoithe; 450MW; c20km	Covered in detail for three spatial levels	Major variations between high and low case scenarios	Local study area £20 m d GVA + £10m id for low case, and £260m + £140m for high case.	Medium (+ve) Medium (-ve) on tourism, fishing and agriculture.	Local study area £8 m d GVA + £4m id for low case, and £9m + £5m for high case.	Minor (+ve) Minor (-ve) on tourism, fishing and agriculture.	
Beatrice; 580MW; 13km 2012	Covered in detail for three spatial levels	Calculated high and low case scenarios, from £17+9m (lc) to £63 +35m (hc) for local study area	2:1	Medium (+ve)	Calculated high and low case scenarios, from £137+63m (lc) to £245 +133 (hc) for local study area over project lifetime	Medium (+ve)	The main focus is on maximising local employment opportunities as far as possible to shift GVA and local employment more towards the High Case Scenario. Several supply chain events.
SeaGreen Alpha; 750 MW; 27km				Major (+ve) supply chain effects. Minor (-ve) disruptive effects on tourism		Medium (+ve) supply chain effects	
Triton Knoll; 869 MW;40k; 2012	Estimates of GVA using Treasury Green Book methods. Issue of which port will be used (raised by PINS NI)	No Data or value provided to show the potential GVA of the construction stage of this project to the Region or the local area.	No Data	Med (+ve) Med (-ve) effects on tourism, fishing and agriculture	No Data or value provided to show the potential GVA for the O&M stage of this project on the Region or the local area.	Minor (+ve) Minor (-ve) effects on tourism, fishing and agriculture	Giving priority to local and regional businesses for supply chain contracts.
E Anglia 1; 714MW; 43km; 2012	Scenario approach; use of NPS guidance	At regional level, GVA of £54.3m and £104.8m GVA pa (For net D & ID FTE)	1:2	Medium (+ve); only minor(-ve) impacts on tourism	For the O&M, net GVA is estimated at £7.2m and £10.6m pa	Minor (+ve); only minor (-ve) impacts on tourism	Focus on upskilling and training, and increasing local economic capacity to respond positively to opportunities

Atlantic Array; 1200MW; 15km; 2013	4 scenarios analysis	Data missing	Data missing	Med (+ve) for local economic development Med(-ve) on tourism and recreational fishing	Data missing	Minor (+ve) for local economic development Minor (-ve) on tourism and recreational fishing	Some initiatives to promote local; supply chain and investments. Project boundary reduced to limit visual impact for tourists.
Burbo Bank; 258MW; 7km; 2013		Est regional impact GVA of £20m	No data	Minor (+ve) economic impact. Potential Med (-ve) for tourism		Minor (+ve) economic impact. Potential Minor (-ve) for tourism –but potential tourism value of wind farm also Minor (+ve)	
Hornsea 1; 1200MW; c115km; 2013	Scenario approach -- e.g. low impact where local ports are not used, medium impact where a local port was used and 50% of supply chain opportunities related to the construction will be locally sourced	GVA estimated at £6.6 m, £56.6 m and £115 m for low, medium, and high scenarios		Major (+ve) Also some impacts on tourism (-ve)	GVA estimated at £1 m, £43 m and £49 m for low, medium, and high scenarios (pa?)	Minor (+ve)	Supply chain brokerage events
Walney Extension; 750MW;14km; 2013	Use of Treasury Green Book approach	£49m D +£15m ID regional GVA – over construction period	Major (+ve)?	Major (+ve) Supply chain impact could be very positive for the regional and local economies, because of regional capacity/experience in metal works and manufacturing. Will include vessel hire, machinery hire, civil/electrical	£11m D +£3m ID	Minor (+ve)	24 hours construction working to minimize impact on fishing. DONG apprenticeships.

				engineering contractors. Also significant impact on fishing and tourism. Major (-ve)		Minor (-ve)	
Dogger Bank Creyke Beck; 1200MW; 148km; 2013	Use of NSIPs national guidance. Port location issue negates any detailed analysis	No data		Potential impact on N. Sea fishing Med/Minor – ve			Examination Authority concerned about need to maximize local and national economic benefits more
Inch Cape; 784MW;15km	In base impact scenario a moderate supply chain capacity and whole life expenditure of 12% impacting on the economic study area, 9% for the rest of Scotland, and a further 17% for the rest of the UK. With the high impact scenario, 33% local, 14% rest of Scotland and 25% rest of UK. Use of HM Treasury's Green Book (2003), Scottish Enterprise (SE) Additionality & Economic Impact Assessment Guidance Note (2008),	Study area expenditure ranging from £300m (base scenario) to £1000m (high impact scenario)		Minor (+ve) Negligible tourism impacts	Study area expenditure ranging from £500m (base scenario) to £1200m (high impact scenario)	Minor (+ve) Negligible tourism impacts	ICOL will support a protocol to give local contractors the opportunity to tender for work arising from the Project capital and operational expenditures. The protocol will ensure that local contractors with the relevant skills and experience will be able to access the procurement process through "meet the buyer" events and other initiatives.

	and NPS Guidance.						
Navitus; 630-970; 10km; 2014	A three scenario approach is used. Low (not local port); medium (local port for construction and O&M), and high (as for med + some local fabrication activity)			Minor (+ve) Tourism impact assessed as Minor (-ve), but potential positive for tourism accommodation. Commercial shipping – minor (-ve) Fishing -- minor(-ve)	£91 m (low scenario) up to £750m (med scenario) over O&M life	Minor (+ve) Commercial shipping – minor (-ve) Fishing -- minor(-ve)	But project cancelled for potential tourism/visual and landscape impacts on a World Heritage Coast
Dogger Bank Teesside; 1200 MW; 200km; 2014	Seen as very positive re impact on development potential of area			Minor (+ve) Tourism and Fishing -- minor(-ve)		Minor(+ve) Tourism and Fishing -- minor(-ve)	'Forewind has developed a programme to actively engage and facilitate the development of the supply chain within North East England. This ongoing work is designed to ensure that businesses based in North East England are as well placed as they possibly can be to tender for the maximum amount of work related to the development of Dogger Bank Teesside A & B.'
E Anglia 3; 1200MW; c70km; 2015	The economic analysis includes: (i) deadweight - what would happen in the absence of the project;	GVA £68 m (low scenario) to £218m (high scenario) for offshore construction; onshore £19m		Medium (+ve) Tourism and recreation Minor (-ve)	GVA of c £14m (pa) for 25 years.	Medium (+ve) Tourism and recreation Minor (-ve)	

	(ii) leakage - the proportion of employment opportunities accessed by people living outside the study area; (iii) displacement – the proportion of project benefit accounted for by a reduction in benefit elsewhere; and (Iv) Substitution - when a firm substitutes one activity for another to take advantage of public sector assistances; and (v) multipliers – to estimate further economic activity associated with additional income and supplier purchases.						
Hornsea 2; 1400MW; 100km offshore; 2015	Good use made of Crown Estate economic data on key project elements	GVA £34 m (low scenario), to £296m for medium scenario to £606m (high scenario) for construction stage, for local area	1:1 for low; 1:1.3 for high	Med (+ve) Minor (-ve) for tourism, fishing and agriculture (onshore cable route) disruption Major (+ve) effect on the development potentials of the area and impact on investors' confidence	From £1m (low) to £64m (med) to £74m (High) for local area pa? Very low multiplier forecast of c1:0.1	Minor (+ve) Minor (-ve) for tourism and fishing Major (+ve) effect on the development potentials of the area and impact on investors' confidence	Employment and Skills Plan; promotion of supply chain opportunities to local business community. Designed in Mitigation measures adopted as part of the project to reduce impact on fishing activities and marine ecosystem

Moray East 2016	Not clear what is the spatial scale of the GVA calculations	Constr: GVA of £245 to £705 m at 2011 prices.		Major (+ve) Minor (-ve) impact on fishing	O&M GVA of £427 – £1,076 m at 2011 prices	Major (+ve) Major (+ve) for economic development potential—especially re inward investment in low-carbon energy ventures.	Safe zones will be created for fishing Mention of embedded standard industry mitigation measures
Est pa GVA for Humber area ranges from £9m (low scen) to £133m (med scen) to £253m (high scen) and, for total cons period, from £40m (£20mdir +£20mindir) to £600m (£260m+£340m), to £1140m (£510m +£630m) for high scenario	Good use of NPS EN-1; Treasury Green Book; UK Input-Output tables; 2012 Crown Estate economic data on key project elements; and BVG Associates (2015). The UK content of operating offshore wind farms. [Online]. Available at: https://c.ymcdn.com/sites/www.renewableuk.com/resource/resmgr/publications/reports/uk_offshore_content_report _n.pdf. BVG Associates (2016). Strategic review of UK east coast staging and construction facilities. [Online]. Available at: https://bvgassociates.com/publications		From 1:1 to 1:1.25	From Minor (+ve) to Major (+ve) depending on which scenario used	GVA from £0m (low scen) to £50 m (high scen) pa for either of the spatial areas. Local multiplier of 1:1.5	From Minor (+ve) to Major (+ve) depending on which scenario used	H3 will develop and deliver an Employment and Skills Plan; promotion of supply chain opportunities to local business community; and identify opportunities for local people to access employment associated with H3. To mitigate the lack of skills for offshore windfarm in the local area, a partnership with Teach First partnership, supporting/collaborating with University Technical Colleges, establishing an apprenticeship scheme and, ring-fencing funds for skills. Science, Technology, Engineering, and Math initiatives through Ørsted's voluntary Community Benefit Funds.
Norfolk Vanguard	It is reported as unrealistic to quantify the		Minor(+ve) Minor (-ve)			Minor(+ve) Minor (-ve)	Investment for manufacturing of windfarm components is on

	expenditure and income effects. Efforts to be aimed at ensuring a vigorous supplier chain ecology is developed in the local and regional business environment through deliberate efforts to recognise and manage business interests in the area.		for important tourism industry Major (+ve) for economic developme nt potential			for important tourism industry Medium (+ve) for economic development potential	the way. Other supply chain development in the region is forecast to bring some investment growth, helping to make the region a vibrant windfarm solutions location.

A4. Assessment: social—primarily qualitative

Project	**Methodology**	**Constructio n stage**	**Signif. Assess**	**O&M: stage**	**Signif. Assess**	**Other**	**Mitigation and enhancement**
Blyth 2010	Not covered other than very descriptively.			Some continuing impact on visual amenity			Some mention of construction noise mitigation.
Kentish Flats 2011	Not covered other than very descriptively	Impacts on housing and local services	Minor (-ve)				
Galloper 2011	Some consideration of impacts on local infrastructure of influx of workers		Minor(-ve)		Minor (-ve)		
Rampion 2012	Use of professional judgement and comparative studies	Impacts primarily on housing and community cohesion	Medium (-ve)	No information?	No information ?		
Neart Na Gaoithe; 450MW; c20km	Social baseline produced, but no social						

	impacts assessment						
Beatrice; 580MW; 13km 2012	Initial reference to effects on other social indicators, but these are very thinly covered. Social impacts are seen as deriving from the economic and environmental conditions, and are seen as difficult to assess directly.	There is little or nothing on community impacts, perception issues and stability and cohesion.					BUT important development of Community Benefits Fund, established in 2016. It has an available total of £6m, split between Highland (£4m) and Moray (£2m), and equally between a Beatrice Partnership Fund (BPF) and a Local Fund for each area (ie £1m Partnership Fund and £1m Local Fund for Moray
SeaGreen Alpha; 750 MW; 27km		Potential impact on some local utilities- from onshore transmission line construction	Medium (-ve)?				
Triton Knoll; 869MW;40 km; 2012	Largely qualitative	Some concern about impact on quality of life and on community facilities (-ve) but also (+ve) re raising skill levels locally	Medium (-ve) re QOL; but minor (+ve) re training/skills	Upskilling	Medium (+ve)		Enhancement/mitigation measures embedded in project design
E Anglia 1; 714MW; 43km; 2012 Scottish Power Renewable /Vattenfall	Qualitative discussion of impacts on several social topics. Little evidence of stakeholder involvement and public participation in arriving at some of the conclusions made. They appear to be solely expert opinions. There was good use of secondary	Impacts on local demographics, community services, housing etc	Medium (+ve) on demographics (more young people); but pressure on local services Med (-ve)	Change in community character	Major/Med(+ve)?		Again focus on upskilling

	sourced from stakeholders and agencies of government, but their direct involvement is not very obvious in the report.						
Atlantic Array; 1200MW; 15km; 2013	Some limited consideration of impacts on tourism accommodation and community services		Minor (-ve)		Minor (-ve)		
Burbo Bank; 258MW; 7km; 2013	Some limited consideration of impacts on housing, community services and community wellbeing/QOL		Med (-ve)		Minor (-ve)		
Hornsea 1; 1200MW; c115km; 2013	Some limited consideration of impacts on housing, community services and community wellbeing/QOL—under high impacts scenario		Minor (-ve)		Minor (-ve)		
Walney Extension; 750MW;14 km; 2013		Housing and local services, and QOL	Minor/Med (-ve)	Local services	Minor (-ve)		
Dogger Bank Creyke Beck; 1200MW; 148km; 2013	'Given the size of the proposed workforce and the relatively short timescale of the proposed construction it is not considered that the provision of additional local services is relevant to Dogger Bank Creyke Beck'						

Inch Cape; 784MW;15 km	Community consultation exercises used. Very little social content	Some potential pressure on tourist accommodation	Minor (+ve/-ve)				
Navitus; 630-970; 10km; 2014	Very little social content—but very strong on visual perception studies, which was the main issue. Considerable consultation with local community.	Many, many chapters on seascape and visual impacts issues, which dominated the ES – perhaps 50% of chapters.	Overall, surveys showed that presence of OWF was unlikely to have strong bearing on whether visitors decide to visit/not to visit the area again. (14% thought they might be put off)		Tourism impact assessed as Minor (-ve), but potential positive for tourism accommodation.		
Dogger Bank Teesside; 1200 MW; 200km 2014	As for Creyke Beck –little or no social impacts analysis						
E Anglia 3; 1200MW; c70km; 2015		Area's demographic structure examined					
Hornsea 2	Some limited consideration of impacts on housing, community services and community wellbeing/QOL—under high impacts scenario	Eg--- Some impacts are envisaged, especially with the construction stage of the project and temporary accommodations are likely, but local area seen to have enough capacity.	Minor (-ve)		Minor (-ve)		ExA probed plans for the introduction of a Community Benefits Fund. Applicant planned to have an operational fund shortly
Moray East 2016		Estimated that housing for holiday purposes and visitors (tourism) will be adversely impacted. However, will be temporary.					

Hornsea 3	Some limited consideration of impacts on housing, community services and community wellbeing/QOL (noise issue)—under high impacts scenario There is heavy focus on economic receptors and the assumption that economic activities can be taken as a measure of social impact	Eg--- Some impacts are envisaged, especially with the construction stage of the project and temporary accommodations are likely, but local area seen to have enough capacity.	Minor (-ve)		Minor (-ve)		
Norfolk Vanguard	Only limited consideration. Several social impacts scoped out at early stage. Focus on impact on community infrastructure (schools, health centres, shops, pubs etc) But --- considerable consultation work with local community/local stakeholders The project has employed a Local Liaison Officer and Skills and Education Champion based in Norfolk, as well as procured support from a Norwich		Minor (-ve)		Minor (-ve)		A traffic impact management plan to mitigate community/business impacts, especially of onshore construction. Embedded mitigations included in the project design, implementation, and construction to reduce the impact of the project (eg the substation has been located to avoid urban areas as much as possible). Construction work will be restricted to minimize the disturbance from noise, vibration, and other adverse impacts

	based Public Engagement agency. The project has continued to deepen and broaden engagement with organisations that support and represent the interests of people and businesses local to landfall, onshore cable route, onshore project substation and National Grid substation, and in the region.						

Appendix 2: From *Overarching NPS for Energy (EN-1)* DEC 2011

5.12 Socio-economic

Introduction

5.12.1 The construction, operation and decommissioning of energy infrastructure may have socio-economic impacts at local and regional levels. Parts 2 and 3 of this NPS set out some of the national level socio-economic impacts.

Applicant's assessment

5.12.2 Where the project is likely to have socio-economic impacts at local or regional levels, the applicant should undertake and include in their application an assessment of these impacts as part of the ES.

5.12.3 This assessment should consider all relevant socio-economic impacts, which may include:

-- the creation of jobs and training opportunities;
-- the provision of additional local services and improvements to local infrastructure, including the provision of educational and visitor facilities;
-- effects on tourism;
--the impact of a changing influx of workers during the different construction, operation and decommissioning phases of the energy infrastructure. This could change the local population dynamics and could alter the demand for services and facilities in the settlements nearest to
the construction work (including community facilities and physical infrastructure such as energy, water, transport and waste). There could also be effects on social cohesion depending on how populations and service provision change as a result of the development; and
-- cumulative effects – if development consent were to be granted to for a number of projects within a region and these were developed in a similar timeframe, there could be some short-term negative effects, for example a potential shortage of construction workers to meet the needs of other industries and major projects within the region.

5.12.4 Applicants should describe the existing socio-economic conditions in the areas surrounding the proposed development and should also refer to how the development's socio-economic impacts correlate with local planning policies.

5.12.5 Socio-economic impacts may be linked to other impacts, for example the visual impact of a development is considered in Section 5.9 but may also have an impact on tourism and local businesses.

IPC decision making

5.12.6 The IPC should have regard to the potential socio-economic impacts of new energy infrastructure identified by the applicant and from any other sources that the IPC considers to be both relevant and important to its decision.
5.12.7 The IPC may conclude that limited weight is to be given to assertions of socio-economic impacts that are not supported by evidence (particularly in view of the need for energy infrastructure as set out in this NPS).
5.12.8 The IPC should consider any relevant positive provisions the developer has made or is proposing to make to mitigate impacts (for example through planning obligations) and any legacy benefits that may arise as well as any options for phasing development in relation to the socio-economic impacts.

Mitigation

5.12.9 The IPC should consider whether mitigation measures are necessary to mitigate any adverse socio-economic impacts of the development. For example, high quality design can improve the visual and environmental experience for visitors and the local community alike.

Appendix 3: Example of an *Employment and Skills Plan* – Hornsea 2 DCO Requirement 17 (PINS 2015)

Employment and skills plan— Requirement 17

(1) No part of the authorized development may be commenced until an employment and skills plan based on the outline employment and skills plan has been submitted to and approved by North Lincolnshire Council in consultation with North East Lincolnshire Council, East Lindsey District Council and the Humber Local Enterprise Partnership.

(2) The plan must include:

(a) proposals for the provision of information to the Humber Local Enterprise Partnership on the employment and supply chain opportunities associated with the construction, operation and maintenance of the authorised development including details of the core qualifications and skillsets required to access those opportunities;

(b) proposals for local advertising of employment and supply chain opportunities during the construction of the authorised development; and

(c) proposals for the undertaker to provide outreach employment presentations during the period of construction of the authorised development at appropriate times and locations; and (d) proposals for local advertising of employment and supply chain opportunities during the operation of the authorised development.

(3) The approved employment and skills plan must be implemented and maintained during the construction and operation of the authorised development.

(4) In this Requirement, “Humber Local Enterprise Partnership” means the local enterprise partnership established in June 2011 with the objective of promoting and developing the natural economic area surrounding the Humber estuary.

JG (211118); building on TO UK ES review summaries
JG finalized 101219